CLAIM(S)

1. Process for the production of materials with interpenetrating organic and inorganic networks on a scale of no more than 100 nm by:

(1) mixing aqueous solutions or dispersions of organic polymers, polymer precursors, or mixtures thereof which are capable of forming polymer networks in the aqueous phase with silicon dioxide compounds;

(2) changing the pH of and/or thermally treating the aqueous solution or dispersion to form a gel consisting of interpenetrating organic and silica gel networks; and

(3) drying the gel.

2. Process according to Claim 1, characterized in that the organic polymers or their precursors are based on formaldehyde or formaldehyde-containing resins, polyvinyl alcohol, or poly(meth)acrylates.

3. Process according to Claim 1 ~~or Claim 2~~, characterized in that sodium silicate, laminar silicates, or silicic acids are used as the silicon dioxide component.

4. Process according to claim 1 ~~one of Claims 1-3~~, characterized in that fillers in the form of particles, fibers, fabrics, nonwovens, mats, or mixtures thereof or functional substances such as dyes, indicators, biomolecules, receptors, or mixtures thereof are added to the aqueous solution.

5. Process according to claim 1 ~~one of Claims 1-4~~, characterized in that the water in the materials is replaced by an organic solvent before drying, and in that the silica gels are modified organically by silylation.

6. Process according to claim 1 ~~one of Claims 1-5~~, characterized in that drying is conducted under conditions which lead to a composite material, where the composite mat rial can then be calcined.

7. Proc ss according to ~~one of Claims 1-5~~ claim 1, characterized in that drying is conducted under conditions which lead to a xerogel or to an aerogel.

8. Materials with organic and inorganic networks which interpenetrate on a scale of no more than 100 nm and are obtainable by a process according to ~~one of Claims 1-7~~ claim 1.

9. Aerogel consisting of organic and inorganic networks interpenetrating on a scale or no more than 100 nm with a density of no more than 0.6 g/cm^3.

10. Use of aerogels according to Claim 9 or aerogels which are obtainable according to the process of Claim 7 for the production of molded articles or surface coatings with thermal insulation properties, sound absorption properties and/or adsorption properties and/or barrier properties versus water and/or organic solvents.

11. Use of composite materials obtainable according to the process of Claim 6 for the production of granulates or molded ceramic articles.

12. Molded article or surface coating consisting of material according to Claim 8 ~~or Claim 9~~.

13. Process for the production of molded articles or surface coatings according to Claim 12, characterized in that the aqueous solutions or dispersions are introduced into a mold or applied to a surface and in that a gel is then formed and dried.

14. Use of materials such as those defined in ~~Claims 6-12~~ claim 8 in conjunction with dyes, indicators, receptors, enzymes, and/or biomolecules for medical diagnostics and sensor technology